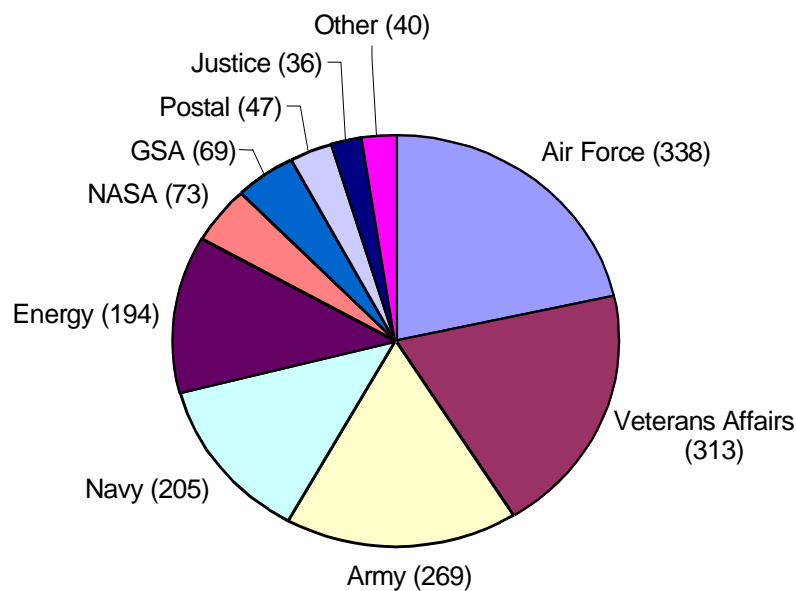


## CHP Potential at Federal Sites

Combined heat and power (CHP) systems provide thermal energy for buildings or processes while at the same time generating a portion of electricity needs. There has been a recent upsurge in interest in fuel-efficient distributed energy resources (DER) such as CHP because of their potential to address key power-sector constraints. CHP was highlighted in the Bush Administration's National Energy Policy Report as being commercially available and offering extraordinary efficiency and environmental benefits.

FEMP has completed a market assessment of the national potential for CHP applications at Federal facilities and the associated costs and benefits including energy and emission savings. It offers a broad overview on when and where CHP systems are most likely to serve the Federal sector's best interest. The conclusion? CHP could make significant contributions toward our energy-conservation and emissions-reduction goals while saving the government money.

**Fig. 1: Potential CHP capacity for major Federal agencies (MW, total = 1590).**



The market assessment considered 7 building types for 28 different Federal agencies. Figure 1 shows the calculated amount of CHP capacity for the 9 major agencies; the others each had capacities of less than 10 MW. Total potential CHP capacity was estimated to be 1500–1600 MW under base-case assumptions using gas reciprocating engine or gas combustion turbine technologies. Electricity produced with this potential capacity would represent approximately 13% of all electric use in the Federal sector.

The Federal building types with greatest CHP potential were hospitals, industrial, and research and development (R&D) facilities. Agencies with most potential were the military, Department of Veterans Affairs, and Department of Energy (DOE).

Sensitivity tests resulted in capacity estimates that varied from 390 MW (doubling installation costs) to 2800 MW (using 1999 commercial power and gas rates instead of 2000 industrial rates). Sizing CHP to supply 100% of thermal needs instead of the base percentages of electrical needs gave a capacity of 1760 MW, not too different from the base case.

### *Does your facility have CHP potential?*

Ideal sites will fit the following profile, but sites meeting only a few of these characteristics may also have a cost-effective CHP opportunity:

- ✓ high electricity prices (>5 cents/kWh);
- ✓ average electric load >1 MW;
- ✓ ratio of average electric load to peak load > 0.7;
- ✓ a central or district heating and/or cooling system in place (or a need for process heat);
- ✓ "spark spread" (difference in price per million site Btu between gas and electricity) >\$12;
- ✓ high annual operating hours (> 6000);
- ✓ thermal demand closely matches electric load; and
- ✓ energy security and reliability upgrades are planned.

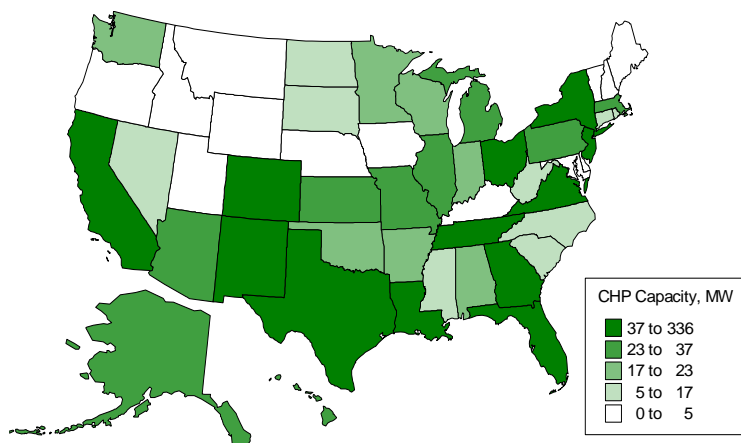
The average costs, payback, and annual savings expected if all the CHP identified in the base case were implemented at Federal sites are shown in the table.

**CHP costs, savings, and payback, by building category, under base case assumptions**

	Hospital	Industrial	Office	Prison	R&D	School	Service	Total
Capacity, MW	446	342	248	36	265	18	211	1567
Operating cost, M\$	23	17	6	2	6	0	5	59
Gas costs, M\$	55	42	15	4	16	1	12	145
Electricity savings, M\$	138	100	44	11	44	3	35	375
Net annual savings, M\$	60	41	23	5	22	2	18	171
Average payback, years	5.3	5.5	7.5	5.8	7.4	7.5	7.4	6.2
Source energy savings	19.3	14.8	5.0	1.5	5.4	0.4	4.3	50.7

The assessment reveals significant Federal potential for CHP in the Southwest (California to Texas), Northeastern metropolitan areas (New York to Washington, D.C.), and the Southeast (Florida, Georgia, Alabama). Figure 2 maps the potential capacity for each state. The 1.5 GW estimated in the base-case scenario has an average simple payback of 7 years and could save the Federal government \$170 million per year in energy costs.

But there are many barriers to Federal CHP projects. Various programs within DOE, along with the Environmental Protection Agency (EPA), are working to address many of the obstacles to CHP (i.e., environmental and regulatory issues). Currently, the Federal Energy Management Program (FEMP) offers unbiased information and technical assistance to any Federal agency interested in developing a CHP project. FEMP services include CHP quick screening, partnership building between Federal sites and project developers and financiers, baseline data collection, design and technical assistance, component matching and system sizing to thermal and power profiles, and technical/price proposal evaluations.



**Fig. 2: Distribution of potential CHP capacity in Federal sites under base case, MW.**

The Federal CHP Market Assessment report can be accessed at [www.ornl.gov/femp/pdfs/chp\\_market\\_assess.pdf](http://www.ornl.gov/femp/pdfs/chp_market_assess.pdf).

### For More Information

DOE's Regional Offices field requests for technical assistance related to CHP, and ORNL coordinates the resources required to provide the needed assistance. For contacts at your regional office, go to [www.eren.doe.gov/femp/financing/femp\\_services\\_who.html](http://www.eren.doe.gov/femp/financing/femp_services_who.html).

To learn more about CHP, visit the FEMP web site at [www.eren.doe.gov/femp/resources/chpguide.html](http://www.eren.doe.gov/femp/resources/chpguide.html) and the DOE Office of Power Technologies CHP website at [www.eren.doe.gov/der/chp/](http://www.eren.doe.gov/der/chp/).

For questions on FEMP services in general, call the FEMP Help Desk: 800-363-3732, or Internet: [www.eren.doe.gov/femp](http://www.eren.doe.gov/femp)